What is claimed is:

1. A current-in-plane magnetic sensor comprising:

a sensor stack including first and second layers of ferromagnetic material, a first nano-oxide layer positioned adjacent to the first layer of ferromagnetic material, and a layer of non-magnetic material positioned between the first and second layers of ferromagnetic material, wherein the thickness of the non-magnetic layer is selected to provide antiferromagnetic coupling between the first and second ferromagnetic layers;

a magnetic field source for biasing the directions of magnetization of the first and second layers of ferromagnetic material in directions approximately 90° with respect to each other;

a first lead connected to a first end of the sensor stack; and a second lead connected to a second end of the sensor stack.

- 2. The magnetic sensor of claim 1, wherein the layer of non-magnetic material has a thickness in the range of 5 to 12 Å.
- 3. The magnetic sensor of claim 1, wherein the first and second layers of ferromagnetic material each have a thickness in the range of 10 to 20 Å.
- 4. The magnetic sensor of claim 1, wherein the antiferromagnetic coupling between the first and second ferromagnetic layers comprises:

RKKY coupling, magnetostatic coupling, or a combination of RKKY coupling and magnetostatic coupling.

- 5. The magnetic sensor of claim 1, wherein the first nano-oxide layer is formed by oxidizing a metallic layer.
- 6. The magnetic sensor of claim 5, wherein the metallic layer comprises a material selected from Al, Ta, Fe, Co and Ni, and alloys of Al, Ta, Fe, Co and Ni.
- 7. The magnetic sensor of claim 5, wherein the metallic layer has a thickness in the range of 5 to 15 Å.
 - 8. The magnetic sensor of claim 1, further comprising: a substrate positioned adjacent to a first side of the sensor stack; and

a cap layer positioned adjacent to the first nano-oxide layer, wherein the first nano-oxide layer is positioned adjacent to a second side of the sensor stack opposite the substrate.

- 9. The magnetic sensor of claim 8, wherein the cap layer comprises an insulator.
- 10. The magnetic sensor of claim 8, wherein the cap layer comprises a material selected from the group of: Al oxide, Fe oxide, Co oxide, Ni oxide, Ta, and TaN.
 - 11. The magnetic sensor of claim 1, further comprising:
- a second nano-oxide layer positioned adjacent to the second layer of ferromagnetic material.
- 12. The magnetic sensor of claim 11, wherein the second nano-oxide layer is formed by oxidizing a metallic layer comprising a material selected from Fe, Co and Ni, and alloys of Fe, Co and Ni.
- 13. The magnetic sensor of claim 12, wherein the metallic layer has a thickness in the range of 5 to 15 Å.
 - 14. The magnetic sensor of claim 11, further comprising: a seed layer positioned adjacent to the second nano-oxide layer.
- 15. The magnetic sensor of claim 14, wherein the seed layer comprises NiFeCr.
- 16. The magnetic sensor of claim 14, wherein the seed layer has a thickness less than 40 Å.
- 17. The magnetic sensor of claim 1, wherein the first ferromagnetic layer comprises a material selected from the group of CoFe, NiFe, Fe, Co and Ni, and alloys thereof, and the second ferromagnetic layer comprises a material selected from the group of CoFe, NiFe, Fe, Co and Ni, and alloys thereof.
- 18. The magnetic sensor of claim 1, wherein the magnetic field source comprises:
 - a permanent magnet positioned adjacent to a side of the sensor stack.
- 19. The magnetic sensor of claim 18, wherein the side is opposite an air bearing side of the sensor stack.

- 20. The magnetic sensor of claim 1, further comprising: a diffusion layer positioned adjacent to the first nano-oxide layer.
- 21. The magnetic sensor of claim 1, wherein:

AFM magnetostatic coupling between the first and second layers of ferromagnetic material is substantially balanced with the FM RKKY coupling.

22. A disc drive comprising:a motor for rotating a magnetic storage disc;an arm for positioning a read head adjacent to the disc; and

wherein the read head includes a sensor stack including first and second layers of ferromagnetic material, a first nano-oxide layer positioned adjacent to the first layer of ferromagnetic material, and a layer of non-magnetic material positioned between the first and second layers of ferromagnetic material, wherein the thickness of the non-magnetic layer is selected to provide antiferromagnetic coupling between the first and second ferromagnetic layers, a magnetic field source for biasing the directions of magnetization of the first and second layers of ferromagnetic material in directions approximately 90° with respect to each other, a first lead connected to a first end of the sensor stack, and a second lead connected to a second end of the sensor stack.

- 23. The disc drive of claim 22, further comprising: a cap layer positioned adjacent to the first nano-oxide layer.
- 24. The disc drive of claim 22, further comprising:
- a second nano-oxide layer positioned adjacent to the second layer of ferromagnetic material.
 - 25. The disc drive of claim 22, further comprising: a diffusion layer positioned adjacent to the first nano-oxide layer.
 - 26. The disc drive of claim 22, wherein:

AFM magnetostatic coupling between the first and second layers of ferromagnetic material is substantially balanced with the FM RKKY coupling.